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Tan et al.

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[45] **Date of Patent: Jun. 12, 1990**

[54] **FACTORY SEALED PACKING CONTAINER**

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[73] Assignee: **Advanced Micro Devices, Inc.**, Sunnyvale, Calif.

[21] Appl. No.: **415,822**

[22] Filed: **Oct. 2, 1989**

[51] **Int. Cl.**[5] **B65D 85/42**

[52] **U.S. Cl.** **206/328**; 206/334; 206/491; 229/178; 229/193; 229/194

[58] **Field of Search** 206/328, 334, 491; 229/132, 160, 177, 178, 179, 193, 194

[56] **References Cited**

U.S. PATENT DOCUMENTS

1,112,442	10/1914	Flack	229/194
1,363,436	12/1920	Richardson	229/117
2,072,256	3/1937	Greve	229/160
2,146,832	2/1939	mcAleer	229/160
2,670,128	2/1954	Stowitts	229/132
3,047,203	7/1962	Etlinger	206/334
3,092,245	6/1963	Poisson	206/334
3,854,651	12/1974	Osborne	229/160
4,197,980	4/1980	Johnson	229/178
4,257,550	3/1981	Frohlicher	229/178
4,528,222	7/1985	Rzpecki et al.	206/334

FOREIGN PATENT DOCUMENTS

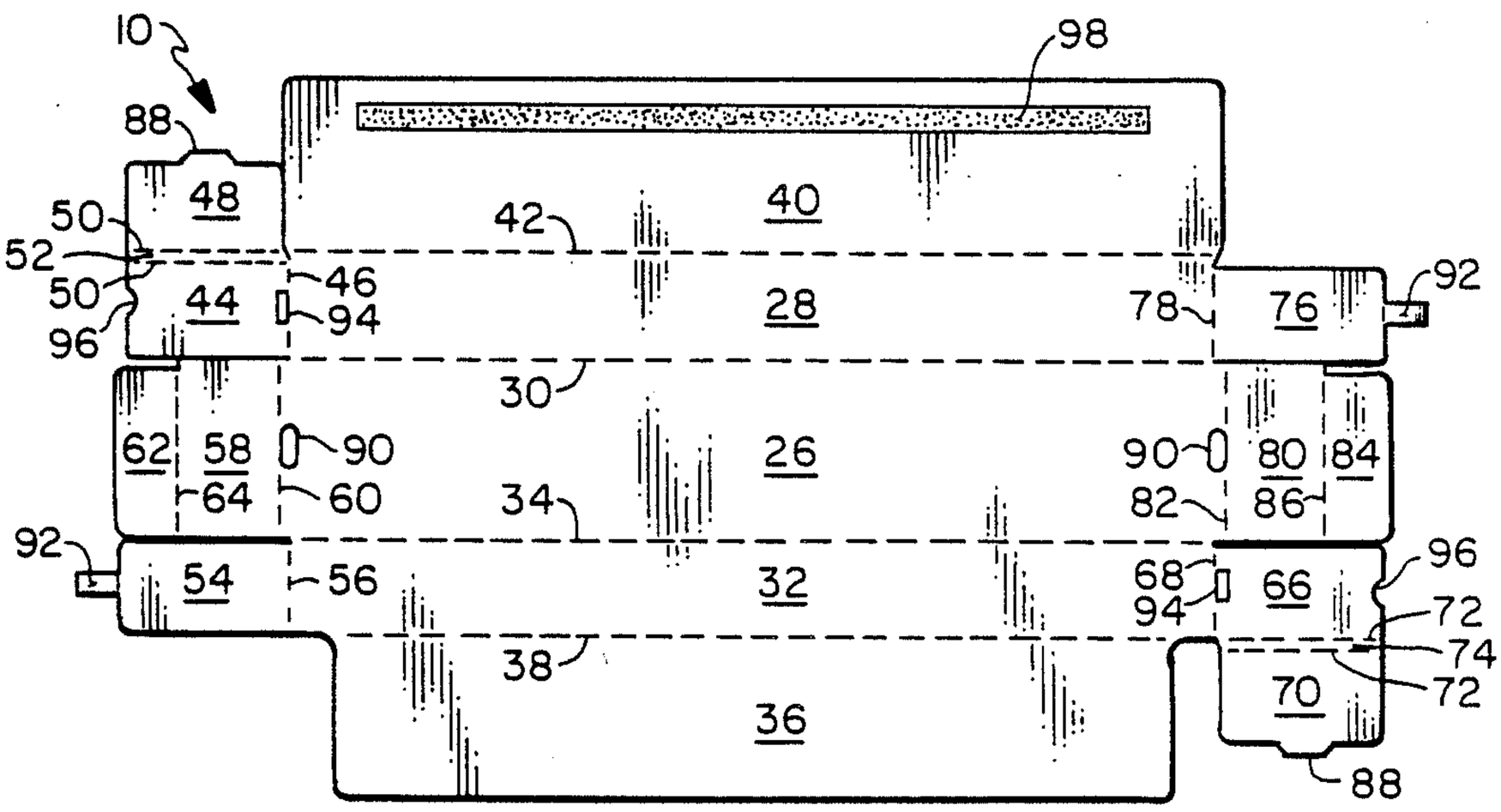
1132137	3/1957	France	229/194

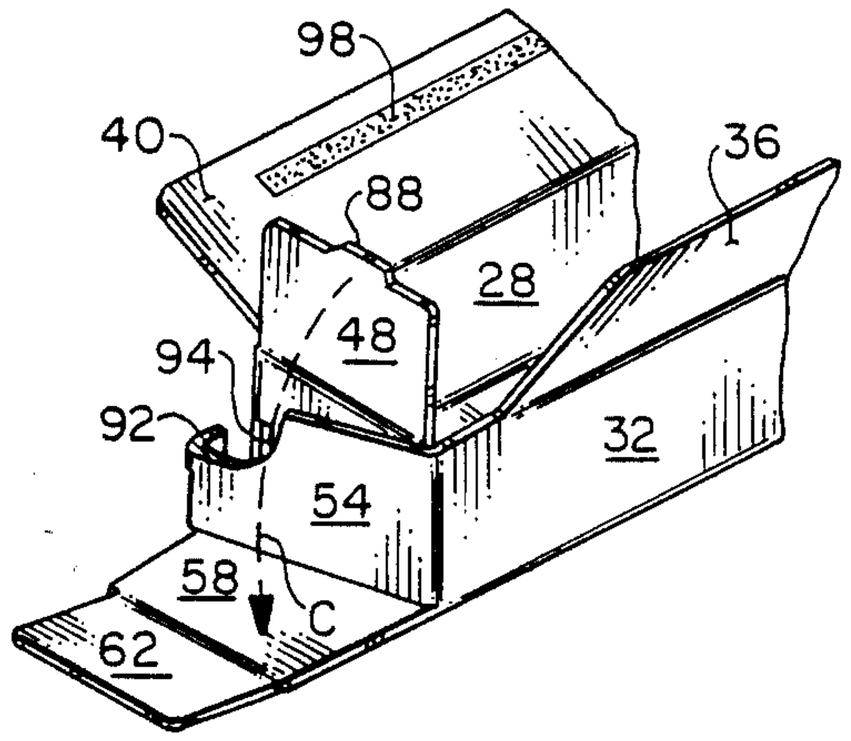
Primary Examiner—David T. Fidei
Attorney, Agent, or Firm—Davis Chin

[57] **ABSTRACT**

A factory sealed packing container for housing a plurality of tubes is formed from a one-piece, die-cut blank of raw material that is cut, scored and foldable for easy set-up by hand or automatically into the assembled container.

9 Claims, 3 Drawing Sheets





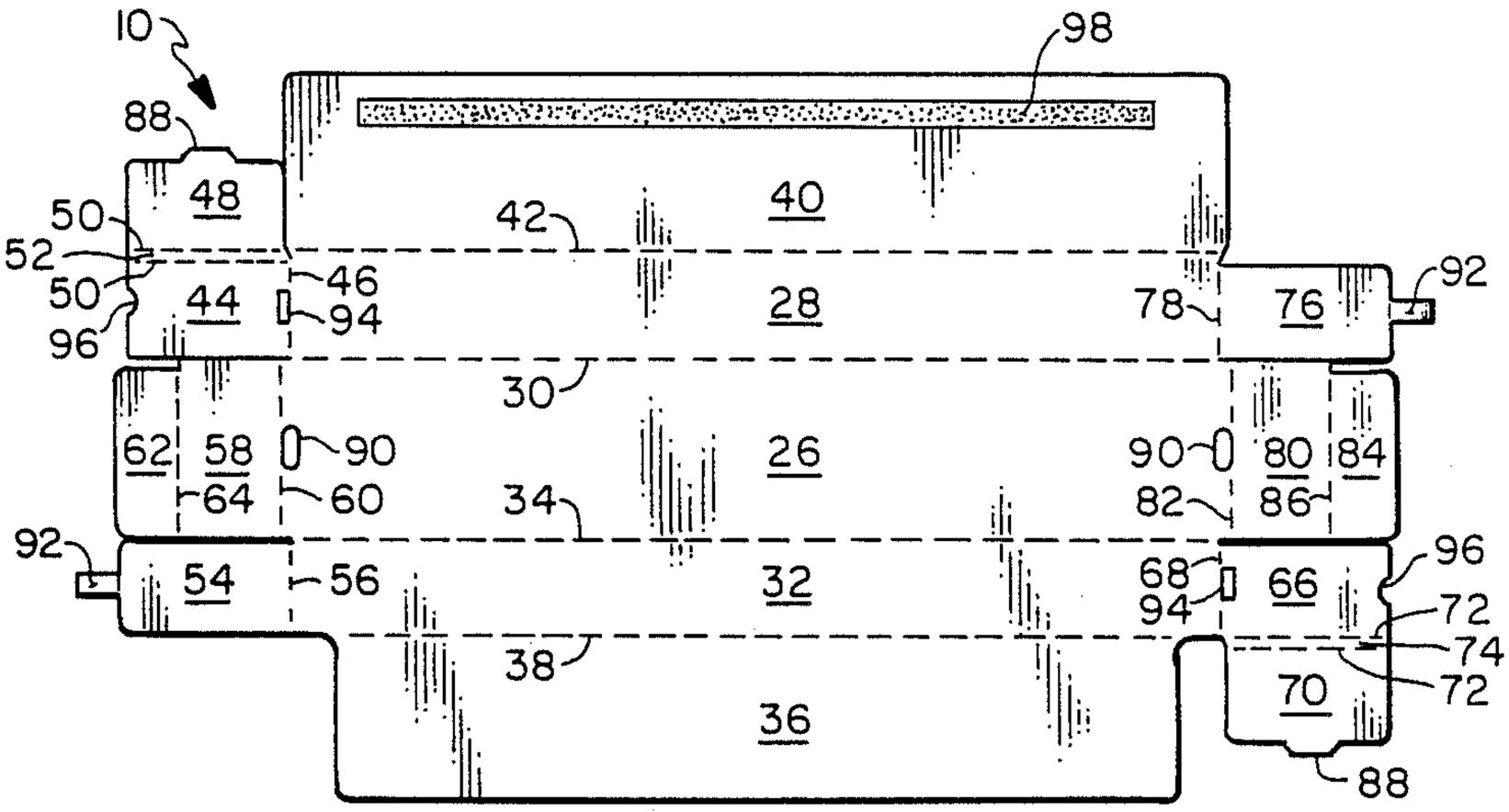

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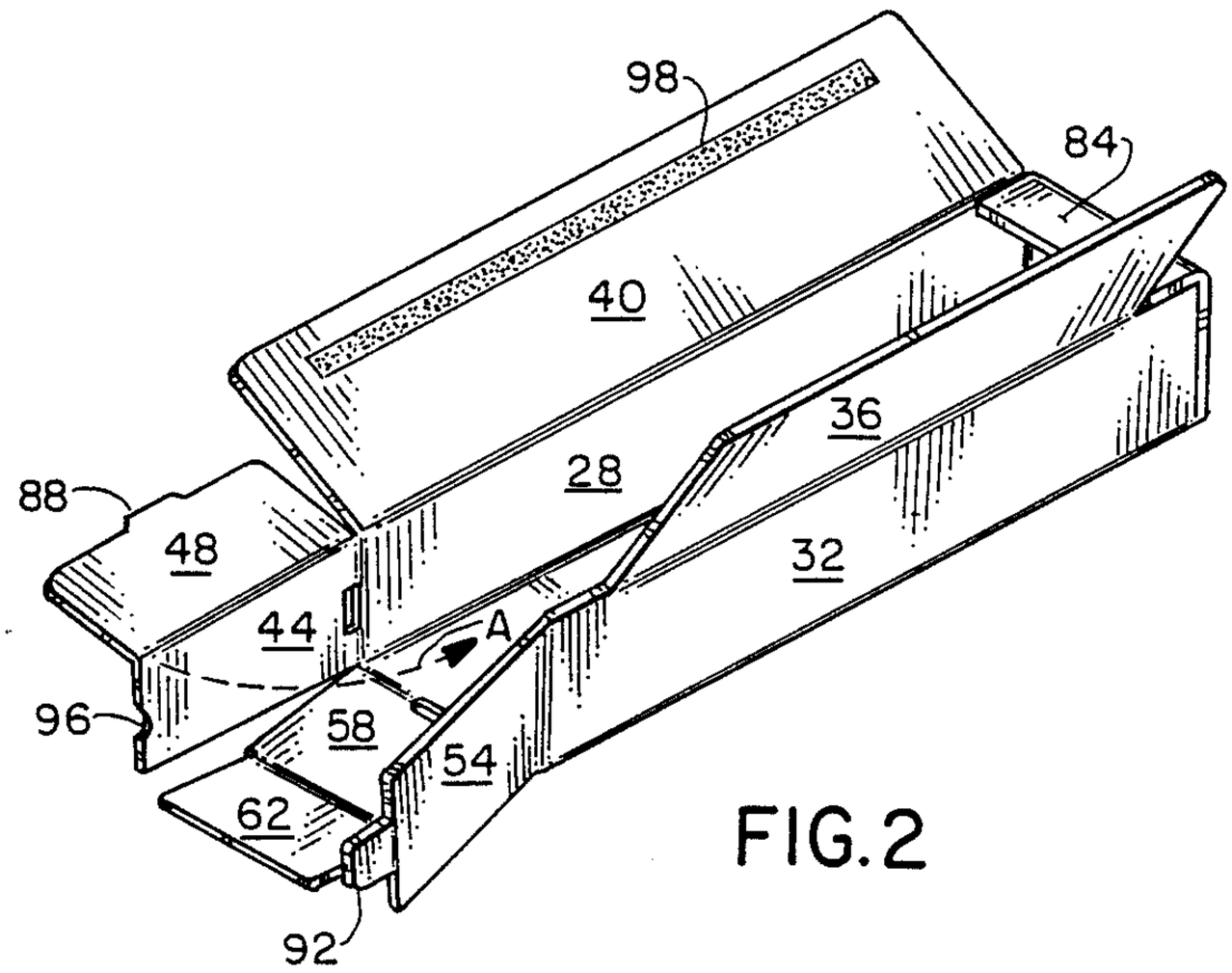
FIG. 1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62
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FIG. 2

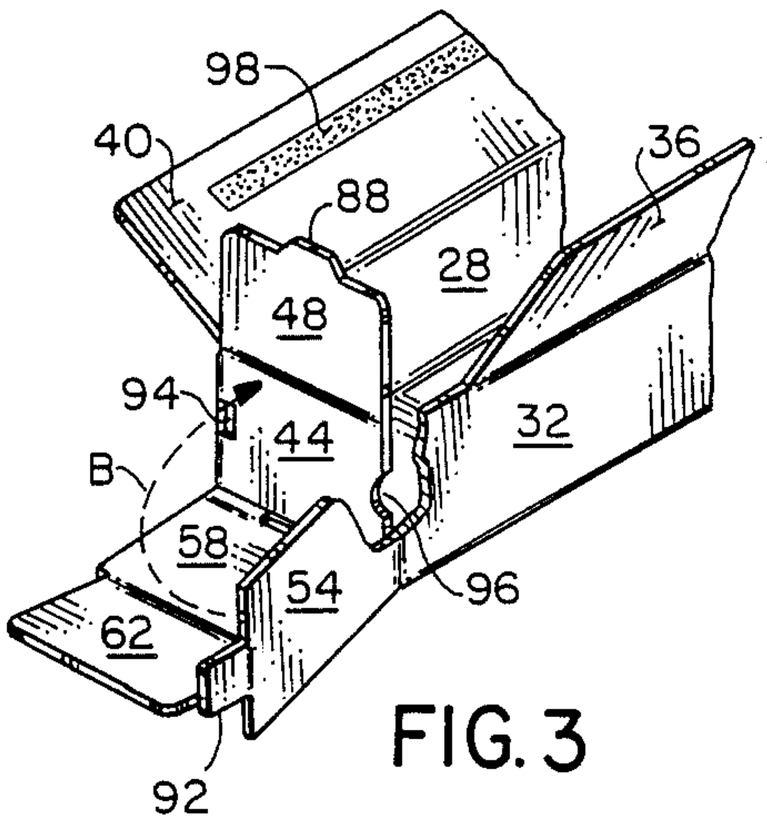

FIG. 3

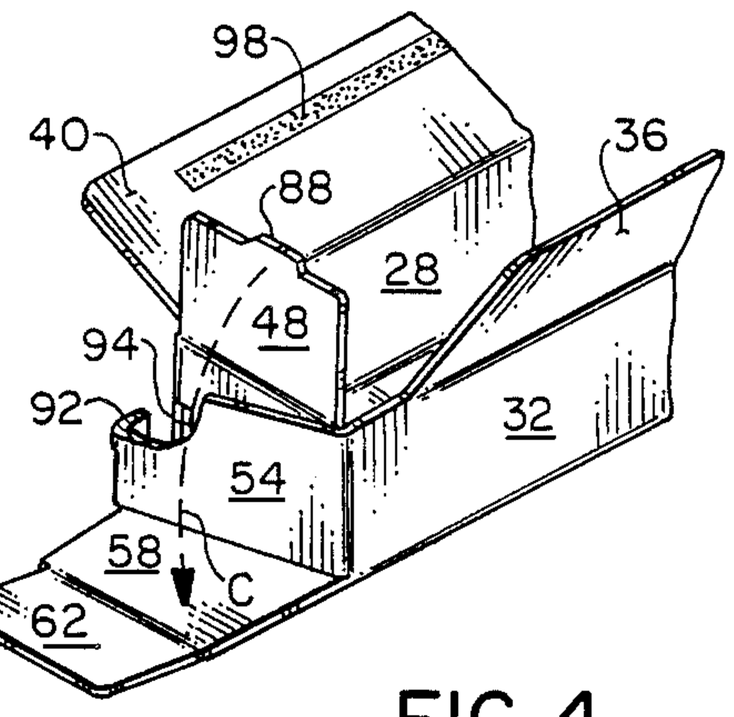

FIG. 4

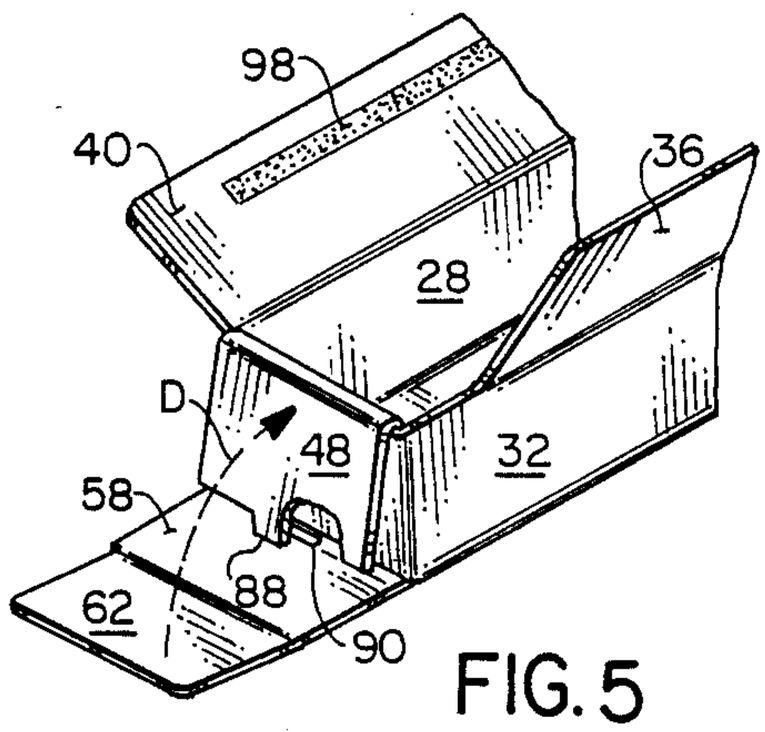

FIG. 5

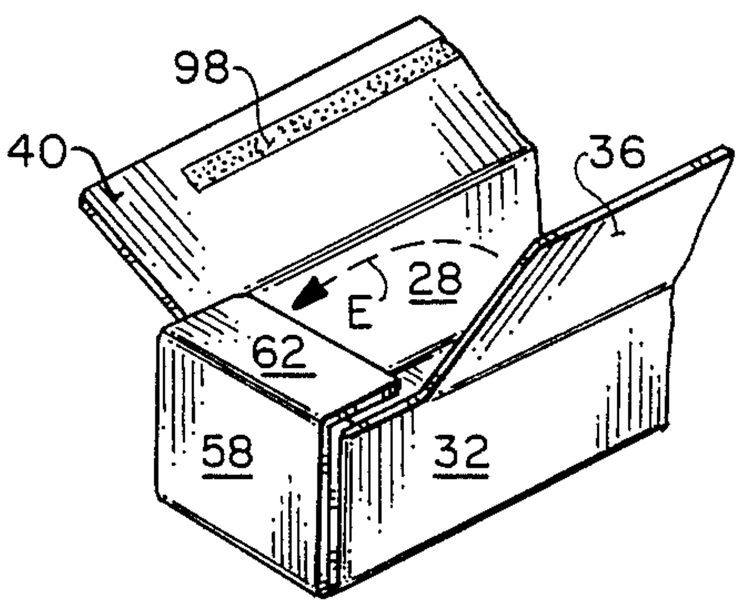

FIG. 6

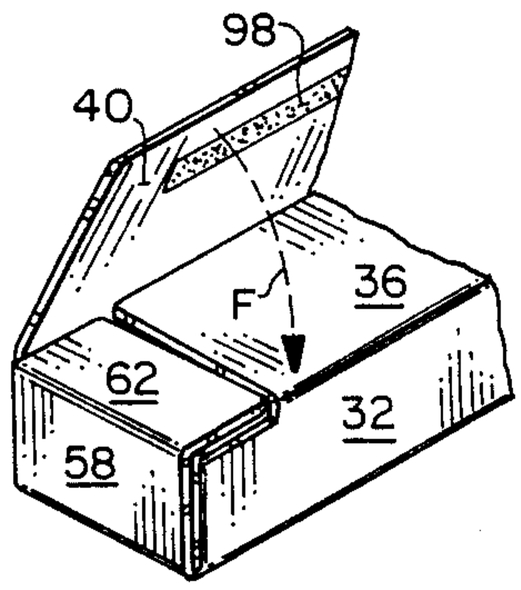

FIG. 7

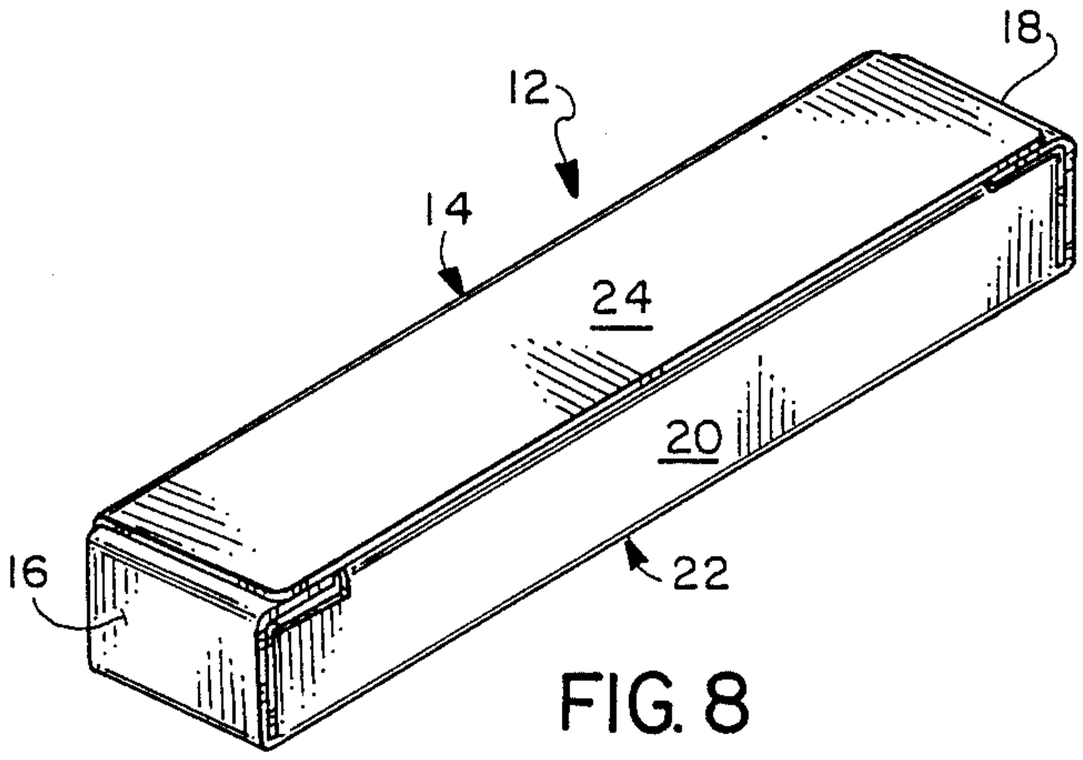

FIG. 8

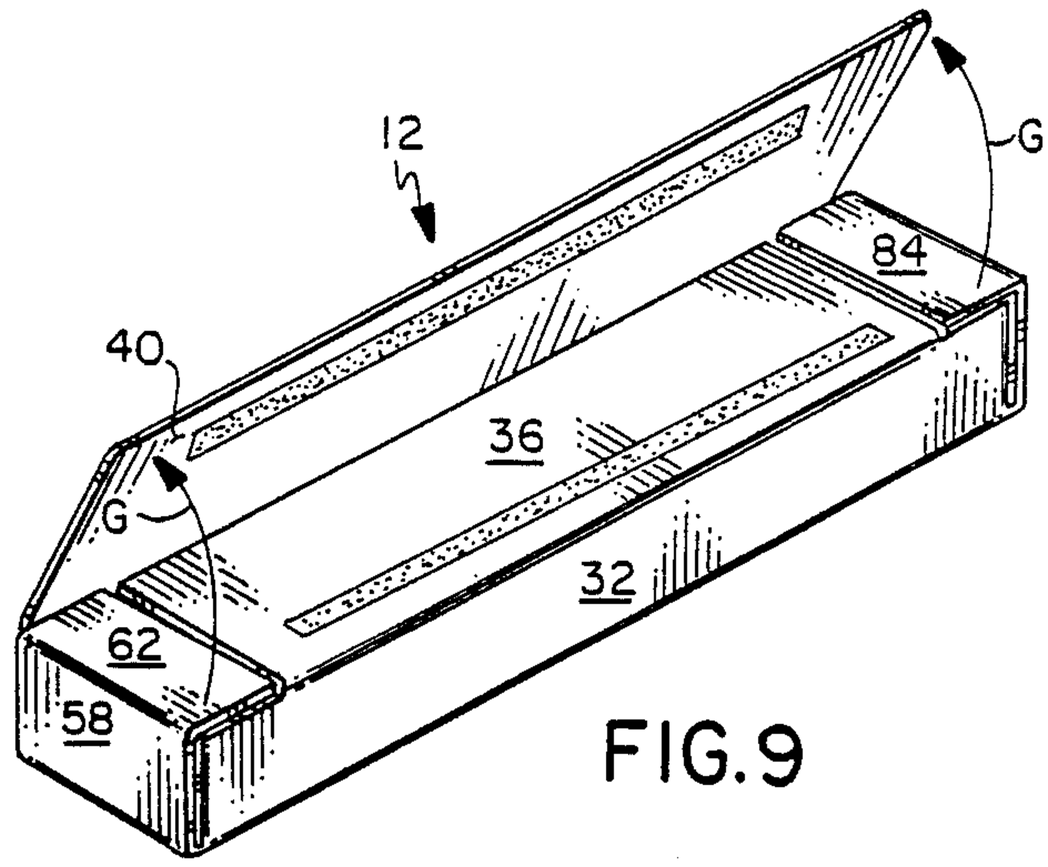

FIG.9

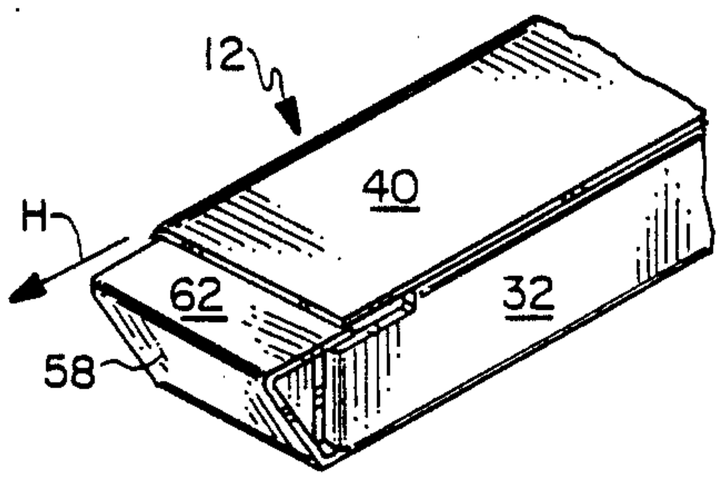

FIG. 10A

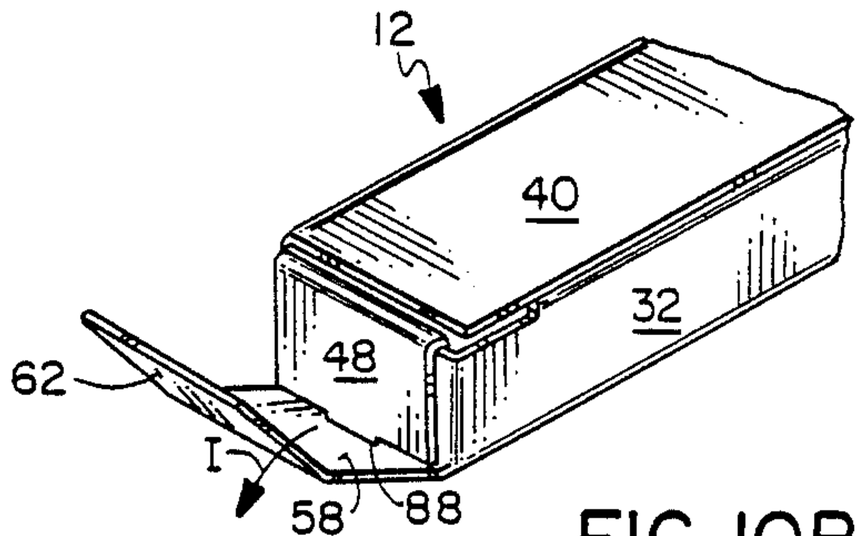

FIG. 10B

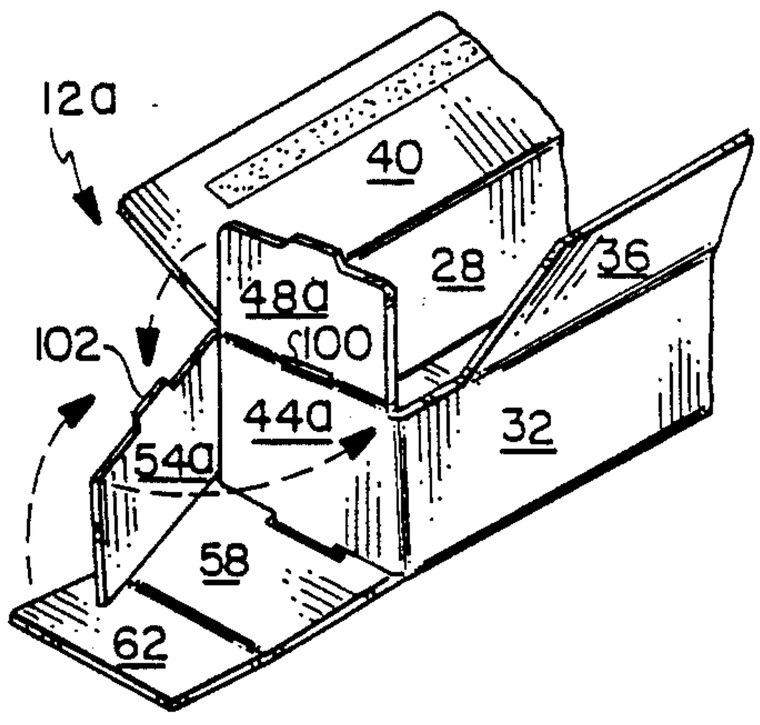

FIG. 11

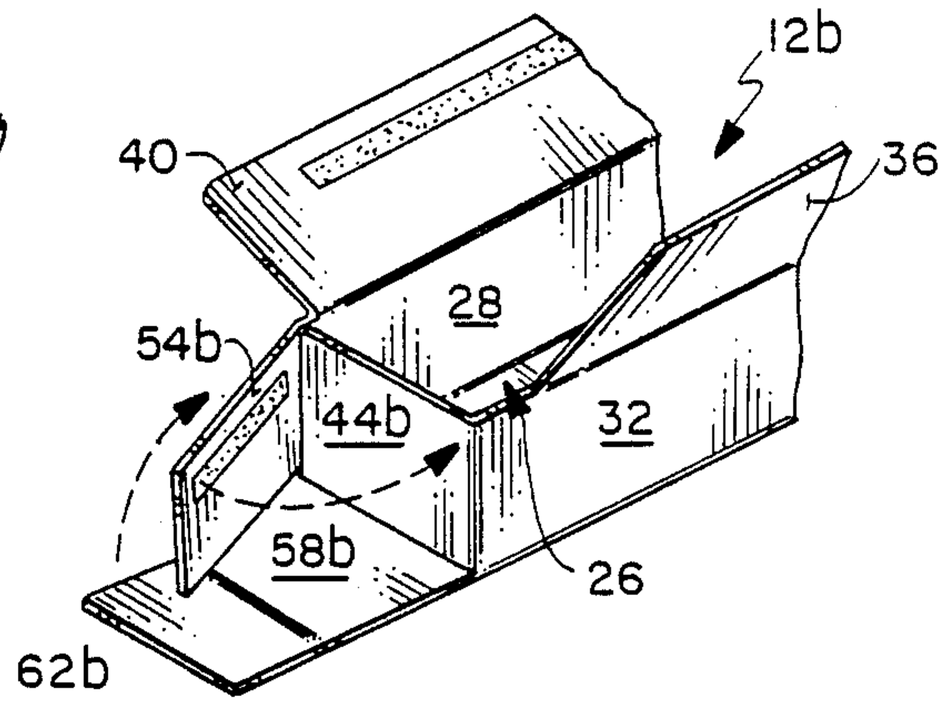

FIG. 12

FACTORY SEALED PACKING CONTAINER

BACKGROUND OF THE INVENTION

This invention relates generally to paperboard containers and more particularly, it relates to an improved factory sealed packing box or container for housing a plurality of tubes. Each of the tubes is preferably used to package electronic components such as leadless chip carriers, plastic lead chip carriers, and the like containing integrated circuit devices with a varying number of lead count.

As it generally known in the art, the integrated circuit devices are susceptible to not only mechanical damage due to their physical handling during manufacturing and shipment, but also can be damaged or destroyed by electrostatic discharge (ESD). Thus, the packing box material is preferably formed of a single layer "B" corrugated board which has an inner liner to provide a conductive coating. The conductive coating serves to protect the I.C. devices against ESD. Further, in order to facilitate loading of the tubes during production, the packing box must allow for top closing. The packing box is then sealed so as to present a level of quality which customers have become accustomed to in the industry. However, for convenience of the end users or customers, the packing box must be capable of being opened at either the top or at both ends so as to permit removal of the tubes.

It is desirable that the packing container be formed from a one-piece, die-cut blank of raw material which is of relatively low cost. Further, it would be expedient that the blank be easily foldable to be set-up by hand to the assembled packing box. In the alternative, it would be desirable to have the blank capable of being automatically formed into the packing box by a conventional "tray-forming" machine and then subsequently sealed automatically after loading by a conventional "auto-case sealer" machine.

SUMMARY OF THE INVENTION

Accordingly, it is a general object of the present invention to provide an improved factor sealed packing container for housing a plurality of tubes and the like which is relatively simple and economical to manufacture and assemble.

It is an object of the present invention to provide a factory sealed packing container for housing a plurality of tubes which is formed from a one-piece, die-cut blank of raw material that is cut, scored and foldable for easy set-up by hand into the assembled container.

It is another object of the present invention to provide a factory sealed packing container for housing a plurality of tubes which allows for top loading during production and allows for either top opening or end opening by the customers.

It is still another object of the present invention to provide a factory sealed packing container for housing a plurality of tubes which is made of inexpensive material and construction, but yet is relatively durable and serviceable.

In accordance with these aims and objectives, the instant invention is concerned with the provision of a factory sealed packing container for housing a plurality of tubes which is formed from a one-piece, die-cut blank of material. The packing container includes a bottom wall panel, a rear wall panel, a front wall panel, an inner major cover flap, an outer major cover flap, rectangularly-shaped inner end wall panels, rectangularly-shaped outer end wall panels, a first intermediate end wall panel, a second intermediate end wall panel, end flaps, and minor cover flaps which are all suitably folded for erection. The free edges of the outer end wall panels are provided with tabs for interlocking with corresponding slots formed in the opposed side edges of the bottom panel.

BRIEF DESCRIPTION OF THE DRAWINGS

These and other objects and advantages of the present invention will become more fully apparent from the following detailed description when read in conjunction with the accompanying drawings with like reference numerals indicating corresponding parts throughout, wherein:

FIG. **1** is a plan view of a one-piece, die-cut blank utilized to form the container constructed according to the principles of the present invention;

FIG. **2** is a perspective view illustrating an initial folding of the blank of FIG. **1** to form the packing container of FIG. **8**;

FIGS. **3** through **7** are perspective views illustrating further folding steps of the blank of FIG. **1**;

FIG. **8** is a perspective view of the packing container of the present invention in its fully assembled condition for housing a plurality of tubes;

FIG. **9** is a perspective view, illustrating a top opening of the assembled packing container;

FIGS. **10A** and **10B** are perspective views, illustrating an end opening of the assembled packing container;

FIG. **11** is a perspective view of a second embodiment of a packing container; and

FIG. **12** is a perspective view of a third embodiment of a packing container.

DESCRIPTION OF THE PREFERRED EMBODIMENTS

Referring now in detail to the various views of the drawings, there is shown in FIG. **1** a one-piece, die-cut blank **10** of a single layer of suitable raw material such as "B" corrugated paperboard or the like which is utilized to form a factory sealed packing container or box **12** for housing a plurality of tubes (not shown). Each of the tubes is preferably used to package electronic components such as leadless chip carriers, plastic lead chip carriers, and the like which houses integrated circuit devices with a varying number of lead count. The assembled packing container **12**, as illustrated in FIG. **8**, is provided with an upright, rectangularly-shaped back or rear wall **14**, oppositely-disposed end walls **16** and **18**, a front wall **20**, a bottom wall **22** and a top wall **24**.

While the respective walls of the packing box **12** may be of various dimensions, it should be of such capacity so that the quantity of tubes contained therein is small enough to make it practical for the customer to order parts only in multiples of that quantity. In the preferred embodiment, the height of the back and front walls is approximately 2 inches, the depth is approximately 3 3/4 inches, and the width is approximately 21 1/8 inches.

In order to provide protection against electrostatic discharge (ESD), the blank **10** of FIG. **1** is formed on its top surface with an inner liner of conductive coating. Further, the blank **10** has formed on its bottom surface an outer liner which is bleached and printable. This outer liner may be printed with designs and logos which

will make the packing box more aesthetically attractive when received by the customers. Further, the outer liner can be printed with the other useful information, i.e., pertaining to the ESD requirement.

Referring again to FIG. **1**, the blank **10** comprises a rectangularly-shaped bottom wall panel **26** to which a rectangularly-shaped rear wall panel **28** is attached along a fold line **30**. A rectangularly-shaped front wall panel **32** is attached to the bottom panel **26** along a fold line **34**. An inner major cover flap **36** is hingedly joined along a fold line **38** to the front wall panel **32**. An outer major cover flap **40** is hingedly attached along a fold line **42** to the rear wall panel **28**.

A rectangularly-shaped inner end wall panel **44** is connected to the rear wall panel **28** along a fold line **46**. A rectangularly-shaped outer end wall panel **48** is secured to the inner end wall panel **44** along double fold lines **50** which defines a narrow connecting panel **52** therebetween. An intermediate end wall panel **54** is connected to the front wall panel **32** along a fold line **56**. An end flap **58** is hingedly joined to the bottom wall panel **26** along a fold line **60**. A minor cover flap **62** is secured to the end flap **58** along a fold line **64**.

Similarly, a rectangularly-shaped inner end wall panel **66** is connected to the front wall panel **32** along a fold line **68**. A rectangularly-shaped outer end wall panel **70** is secured to the inner end wall panel **68** along double fold lines **72** which defines a narrow connecting panel **74** therebetween. An intermediate end wall panel **76** is connected to the rear wall panel **28** along a fold line **78**. An end flap **80** is hingedly joined to the bottom wall panel **26** along a fold line **82**. A minor cover flap **84** is secured to the end flap **80** along a fold line **86**.

In the intermediate area of the free edges of the outer end wall panels **48** and **70**, there are provided tabs or projections **88**. Each of the projections **88** are adapted to interlock within a corresponding one of slots **90** formed in the bottom wall panel **26** along the fold lines **60** and **82** when the blank **10** is set up so as to maintain the outer end wall panels **48**, **70** and inner end wall panels **44**, **66** in the erected position. Further, each of the intermediate end wall panels **54** and **76** is provided with an extension panel **92** formed integrally on its free edge thereof. The extension panels **92** are adapted to extend through a corresponding one of slots **94** formed in the inner end wall panels **46**, **66** along the respective fold lines **46**, **68** for interlocking engagement. The inner end wall panels **44**, **66** also include an arcuate cut-out portion or opening **96** of a semicircular-shape on their free edges which are used to facilitate end opening of the container, as will be described more fully hereinafter.

It will be noted that the width dimension of the inner cover flap **36** is somewhat smaller than the width dimension of the outer cover flap **40**. The inner and outer cover flaps are secured in fully overlapped relationship by glue **98** or adhesive tape so as to form the fully assembled packing container **12** of FIG. **8**.

In order to form the fully assembled factory sealed packing container **12** of FIG. **8**, the blank **10** is initially forwarded as shown in FIG. **2**. As illustrated therein, the rear wall panel **28** and front wall panel **32** are bent vertically upward about their respective fold lines **30**, **34**. Next, the inner end wall panel **44** is folded inwardly at the right angle to the rear wall panel **28** along the fold line **46** in the direction of arrow A. It will be understood that the inner end wall panel **66** is folded in a similar manner with respect to the front wall panel **32**.

Next, as depicted in FIG. **3**, in this position the intermediate end wall panel **54** is bent inwardly at a right angle to the front wall panel **32** along the fold line **56** in the direction of arrow B. The extension panel **92** of the intermediate end wall panel **54** is inserted into and through the slot **94** formed in the inner end wall panel **44** so as to form an interlocking engagement. This is shown in FIG. **4**. Again, the intermediate end wall panel **76** is folded and is secured in a similar manner with respect to the inner end wall panel **66**. Then, the outer end wall panel **48** is further folded downwardly in the direction of arrow C (shown in FIG. **4**) so that the projection or tab **88** is interlocked or engaged within the corresponding slot **90** in the bottom wall panel **26**, as illustrated in FIG. **5**. The outer end wall panel **70** is folded and secured in a like fashion. It will be noted that the intermediate end wall panels **54** and **76** are sandwiched between the respective ones of the inner end wall panels **44**, **66** and the outer end wall panels **48**, **70**.

Next, the end flap **58** is bent upwardly at a right angle to the bottom wall panel **26** along the fold line **60** in the direction of arrow D. The end flap **80** is simultaneously folded along the fold line **82**. After loading a plurality of tubes of devices, the minor cover flaps **62** and **84** are folded downwardly and inwardly to the position shown in FIG. **6**. Then, the major inner cover flap **36** is folded downwardly and inwardly in the direction of arrow E so that their side edges are disposed adjacent the free edges of the minor cover flaps **62** and **84**, as illustrated in FIG. **7**. Finally, the major outer cover flap **40** is folded downwardly and inwardly in the direction of arrow F so as to be in fully overlapped relationship with the major inner cover flap **36**. The strip of glue **98** may be applied to the inner surface of the outer cover flap **40** prior to the folding of the same so as to form a fully assembled factory sealed packing container shown in FIG. **8**. Alternatively, an adhesive tape may be used to secure the inner and outer cover flaps together.

In FIG. **9**, there is shown a top opening method for the packing container **12**. This is achieved by breaking the glue seal or adhesive tape and subsequently lifting of the major outer cover flap **40** in the direction of arrow G. Then, the major inner cover flap **36** is lifted to provide access to the plurality of tubes.

In FIGS. **10A** and **10B**, there is shown an alternate end opening method for the packing container **12**. This is achieved by initially pulling outwardly minor cover flap **62** in the direction of arrow H, which had been tucked underneath the major outer cover flap **40**. Then, the minor cover flap **62** is pulled downwardly in the direction of arrow I so as to release the tab **88** on the outer end wall panel **48** from the slot **90** in the bottom wall panel **26**. In order to complete the end opening method from the position of FIG. **5** to the position of FIG. **2**, it is only necessary to unfold the packing container **12** through the steps illustrated in FIGS. **4**, **3** and **2**. A finger of the end user or customer can be inserted into the opening **96** of FIG. **3** for pulling outwardly the inner end wall panel **44**, thereby facilitating end opening of the container. It should be apparent that either of the end walls **16**, **18** of the box can be opened in this fashion.

A second embodiment of a packing container **12***a* is shown in FIG. **11**. By comparing FIGS. **11** and **3**, it can be seen that the one difference is that a slot **100** is formed in the inner end wall **44***a* on its top edge in FIG. **11** rather than having the slot **94** on the side edge in FIG. **3**. Also, the arcuate opening **96** has been eliminated. Further, a tab or projection **102** is formed on the

top edge of the intermediate end wall panel **54***a* of FIG. **11** rather than having the extension panel **92** shown in FIG. **3**. Thus, the tab **102** is adapted to interlock with the slot **100**. Except for these differences, the assembling and opening of the package container **12***a* is identical to that described with respect to the packing container **12**.

Further, a third embodiment of a packing container **12***b* is shown in FIG. **12**. By comparing FIGS. **12** and **11**, it can be seen that the outer end wall panel **48***a* of FIG. **11** and associated tabs and slots have been eliminated in FIG. **12**. As a result, the packing container **12***b* of FIG. **12** can be formed automatically from a die-cut blank by a conventional "tray-forming" machine and the inner end wall panel **44***b*, outer end wall panel **54***b*, and end flap **58***b* can be hot glue sealed automatically by a conventional "auto-case sealer" machine.

From the foregoing detailed description, it can thus be seen that the present invention provides an improved factory sealed packing container for housing a plurality of tubes which is formed from a one-piece die-cut blank of material that is cut, scored and foldable for easy set-up by hand or automatically into the assembled container. Further, the packing container permits ready access to its interior by either a top opening method or an end opening method.

While there has been illustrated and described what is at present considered to be preferred embodiments of the present invention, it will be understood by those skilled in the art that various changes and modifications may be made, and equivalents may be substituted for elements thereof without departing from the true scope of the invention. In addition, many modifications may be made to adapt a particular situation or material to the teachings of the invention without departing from the central scope thereof. Therefore, it is intended that this invention not be limited to the particular embodiments disclosed as the best mode contemplated for carrying out the invention, but that the invention will include all embodiments falling within the scope of the appended claim.

What is claimed is:

1. A factory sealed packing container for housing a plurality of tubes, comprising:

a bottom wall panel (**26**) having a rear, front and opposed side edges;

a rear wall panel (**28**) connected along a fold line to the rear edge of said bottom wall panel (**26**) and extending up at right angles thereto:

a front wall panel (**32**) connected along a fold line to the front edge of said bottom panel (**26**) and extending up at right angles thereto;

an inner major cover flap (**36**) hingedly joined along a fold line to an upper edge of said front wall panel (**32**) and extending inwardly at right angles thereto;

an outer major cover flap (**40**) hingedly attached along a fold line to an upper edge of said rear wall panel (**28**) and extending inwardly at right angles thereto;

rectangularly-shaped inner end wall panels (**44**, **66**) connected along fold lines to side edges of said respective rear and front wall panels (**28**, **32**) and extending inwardly at right angles thereto;

rectangularly-shaped outer end wall panels (**48**, **70**) connected along fold lines to upper edges of said inner end wall panels (**44**, **66**) and extending downwardly therefrom in a spaced apart parallel relationship therewith;

a first intermediate end wall panel (**54**) connected along a fold line to a side edge of said front wall panel (**32**) and extending inwardly therefrom between said inner and outer end wall panels (**44**, **48**);

a second intermediate end wall panel (**76**) connected along a fold line to a side edge of said rear wall panel (**28**) and extending inwardly therefrom between said inner and outer end wall panels (**66**, **70**);

end flaps (**58**, **80**) connected to said opposed side edges of said bottom panel (**26**) and extending upwardly at right angles thereto; and

minor cover flap (**62**, **84**) hingedly attached to respective upper edges of said end flaps (**58**, **80**) and extending inwardly therefrom underneath said outer major cover flap (**40**).

2. A packing container as claimed in claim **1**, wherein the free edges of said first and second intermediate end wall panels (**54**, **76**) are provided with extension panels (**92**) for interlocking engagement with corresponding slots (**94**) formed in said inner end wall panels (**44**, **66**).

3. A packing container as claimed in claim **2**, wherein the free edges of said outer end wall panels (**48**, **70**) are provided with tabs (**88**) for interlocking with corresponding slots (**90**) formed in the opposed side edges of said bottom panel (**26**).

4. A packing container as claimed in claim **3**, wherein the free edges of said inner end wall panels (**44**, **66**) are provided with arcuate openings (**96**) to facilitate end opening of the container.

5. A packing container as claimed in claim **1**, wherein the inner surfaces of said container is provided with an inner liner of conductive coating so as to protect against electrostatic discharge.

6. A packing container as claimed in claim **1**, wherein said rear and front wall panels (**28**, **32**) have the height of approximately 2 inches and has a width of approximately 21 1/8 inches.

7. A packing container as claimed in claim **1**, wherein upper free edges of said first and second intermediate end wall panels (**54**, **76**) are provided with tabs (**102**) for interlocking with corresponding slots (**100**) formed in the upper edges of said inner end wall panels (**44**, **66**).

8. A packing container as claimed in claim **7**, wherein the free edges of said outer end wall panels (**48**, **70**) are provided with tabs (**88**) for interlocking with corresponding slots (**90**) formed in the opposed side edges of said bottom panel (**26**).

9. A packing container as claimed in claim **1**, wherein the free edges of said inner end wall panels (**44**, **66**) are provided with arcuate openings (**96**) to facilitate end opening of the container.

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